CLAIMS

What is claimed is:

1. A ball joint comprising:

a socket having at least one opening and an inner chamber;

a bearing assembly disposed in said chamber of said socket;

a ball stud having a central ball portion and a stud portion, said ball portion supported by said bearing assembly; and

a resilient bushing disposed in said chamber and fixedly attached to said stud portion of said ball stud.

2. The ball joint according to Claim 1, wherein said bushing is disposed in said chamber such that an outer surface of said bushing cannot move relative to the surface of said chamber.

3. The ball joint according to Claim 1, wherein said ball portion of said ball stud has a bore formed therethrough and said stud portion is disposed within said bore.

4. The ball joint according to Claim 1, wherein said bushing is has a longitudinal bore formed therethrough, and wherein a sleeve is disposed in said bore of said bushing.

5. The ball joint according to Claim 4, wherein said sleeve is fixedly attached to said bushing.

6. The ball joint according to Claim 4, wherein said sleeve is fixedly attached to said bushing with an adhesive.

7. The ball joint according to Claim 4, wherein said stud portion is slidably disposed in said sleeve.

8. The ball joint according to Claim 4, wherein said stud portion further includes at least one key provided on an outer surface thereof and said sleeve includes at least one keyway provided on an inner surface thereof, and wherein said key of said stud portion is slidably disposed in said keyway of said sleeve.

9. The ball joint according to Claim 1, wherein said ball portion of said ball stud has a first axis and second axis transverse to the first axis, an intersection of the first axis and the second axis defining a center of oscillation, wherein said ball portion is normally centered on the center of oscillation.

10. The ball joint according to Claim 9, wherein said resilient bushing is formed of a material having a predetermined hardness to thereby apply a restoring force to maintain or return said ball stud to the normally centered position.

11. The ball joint according to Claim 1, further including a seal for sealing said at least one opening of said socket.

12. The ball joint according to Claim 1, wherein said bearing assembly includes first and second spaced apart bearings members for supporting said ball portion of said ball stud.

13. The ball joint according to Claim 1, wherein said resilient bushing is formed from one of rubber and neoprene.

14. A ball joint for a vehicle having steering wheel, said ball joint comprising:

a socket having at least one opening and an inner chamber;

a bearing assembly disposed in said chamber of said socket;

a ball stud having a central ball portion and a stud portion, said ball portion supported by said bearing assembly; and

a resilient bushing disposed in said chamber and fixedly attached to said stud portion of said ball stud, wherein said ball portion has a first axis and second axis transverse to the first axis, an intersection of the first axis and the second axis defining a center of oscillation, wherein said ball portion is normally centered on the center of oscillation, and wherein said resilient bushing is formed of a material having a predetermined hardness to thereby apply a restoring force to maintain or restore said ball stud to the normally centered position.

15. The ball joint according to Claim 14, wherein said bushing is disposed in said chamber such that an outer surface of said bushing cannot move relative to the surface of said chamber.

16. The ball joint according to Claim 14, wherein said ball portion of said ball stud has a bore formed therethrough and said stud portion is disposed within said bore.

17. The ball joint according to Claim 14, wherein said bushing is has a longitudinal bore formed therethrough, and wherein a sleeve is slidably disposed in said bore of said bushing.

18. The ball joint according to Claim 14, wherein said sleeve is fixedly attached to said bushing.

19. The ball joint according to Claim 14, wherein said stud portion further includes at least one key provided on an outer surface thereof and said sleeve includes at least one keyway provided on an inner surface thereof, and wherein said key of said stud portion is slidably disposed in said keyway of said sleeve.

20. A tie rod end adapted for use in a vehicle having a steering wheel for controlling steerable wheels, said tie rod end comprising:

a socket having at least one opening and an inner chamber;

a stem extending outwardly from said socket;

a bearing assembly disposed in said chamber of said socket;

a ball stud having a central ball portion and a stud portion, said ball portion supported by said bearing assembly, wherein said ball portion has a first axis and second axis transverse to the first axis, an intersection of the first axis and the second axis defining a center of oscillation, wherein said ball portion is normally centered on the center of oscillation; and

a resilient bushing disposed in said chamber and fixedly attached to said stud portion of said ball stud, wherein said resilient bushing is formed of a material having a predetermined hardness to thereby apply a restoring force to maintain or restore said ball stud to the normally centered position, and wherein when a torsional force is applied to said ball stud by turning of a vehicle steering wheel, said ball stud is caused to rotate about the first axis.